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DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

2. The factual inquiries set forth in *Graham v. John Deere Co.*, 383 U.S. 1, 148 USPQ 459 (1966), that are applied for establishing a background for determining obviousness under 35 U.S.C. 103(a) are summarized as follows:

1. Determining the scope and contents of the prior art.
2. Ascertaining the differences between the prior art and the claims at issue.
3. Resolving the level of ordinary skill in the pertinent art.
4. Considering objective evidence present in the application indicating obviousness or nonobviousness.

3. This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

4. Claims 24-27, 31-33 and 35-39 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates et al. (U.S. 5,597,660) in view of Barker et al. (U.S. 2003/0027049).

Regarding claim 24, Bates et al. discloses a microbattery comprising:

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- in the form of thin layers (abstract), at least first (28) and second electrodes (24) between which a solid electrolyte (24) is disposed,
- the electrolyte comprises grouping $[XY_1Y_2Y_3Y_4]$ (C3/L45-48)
- where X is located in a tetrahedron whose peaks are respectively formed by the chemical elements Y_1 , Y_2 , Y_3 and Y_4 , the chemical element X being selected from the group consisting of **phosphorus**, boron, silicon, sulphur, molybdenum, vanadium and germanium and the chemical elements Y_1 , Y_2 , Y_3 and Y_4 being selected from the group consisting of sulphur, **oxygen**, fluorine and chlorine, (Li_3PO_4 , C3/L45-48).
- wherein the second electrode (24) comprises at least one grouping of the $[X'Y'_1Y'_2Y'_3Y'_4]$ type, where X' is located in a tetrahedron whose peaks are respectively formed by the chemical elements Y'_1 , Y'_2 , Y'_3 and Y'_4 , (C3/L42-45)
- the chemical element X' being selected from the group consisting of phosphorus, boron, silicon, sulphur, molybdenum, **vanadium** and germanium and (VO_x , C3/L42-45)
- the chemical elements Y'_1 , Y'_2 , Y'_3 and Y'_4 being selected from the group consisting of sulphur, **oxygen**, fluorine and chlorine (VO_x , C3/L42-45).
- wherein the electrolyte (26) comprises an alkaline metal ion A selected from the group consisting of **lithium** and sodium (Li_3PO_4 , C3/L45-48).

Bates et al. does not explicitly disclose a microbattery:

- wherein the first electrode and electrolyte both comprise at least one common grouping of the $[XY_1Y_2Y_3Y_4]$ type

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- wherein the first electrode comprises the alkaline metal ion A,
- a mixture of metallic ions T comprising at least one transition metal ion selected from the group consisting of titanium, vanadium, chromium, cobalt, nickel, manganese, iron, copper, niobium, molybdenum and tungsten and
- a chemical element B selected from the group consisting of sulphur, oxygen, fluorine and chlorine, so as to form a compound of $A_{x_l}T_{y_l}[XY_1Y_2Y_3Y_4]_{z_l}B_{w_l}$ type with the $[XY_1Y_2Y_3Y_4]$ grouping, with x_l and $w_l \geq 0$ and y_l and $z_l > 0$,
- a chemical element E selected from the group consisting of metals and carbon being dispersed in the compound.

Barker et al. disclose electrode comprising a grouping of the $[XY_1Y_2Y_3Y_4]$ type where X is located in a tetrahedron whose peaks are respectively formed by the chemical elements Y_1 , Y_2 , Y_3 and Y_4 , the chemical element X being selected from the group consisting of **phosphorus**, boron, silicon, sulphur, molybdenum, vanadium and germanium and the chemical elements Y_1 , Y_2 , Y_3 and Y_4 being selected from the group consisting of sulphur, **oxygen**, fluorine and chlorine for a battery ($Li_aM_b(PO_4)Z_d$, [0045]). Barker et al. further discloses, in a battery, a first electrode comprises the alkaline metal ion A selected from the group consisting of **lithium** and sodium, a mixture of metallic ions T comprising at least one transition metal ion selected from the group consisting of titanium, vanadium, chromium, cobalt, nickel, manganese, **iron**, copper, niobium, molybdenum and tungsten and a chemical element B selected from the group consisting of sulphur, oxygen, fluorine and **chlorine**, so as to form a compound of $A_{x_l}T_{y_l}[XY_1Y_2Y_3Y_4]_{z_l}B_{w_l}$ type with the $[XY_1Y_2Y_3Y_4]$ grouping, with x_l and $w_l \geq 0$ and y_l and $z_l > 0$ (Li_2FePO_4Cl , [0086]) and further comprising a chemical element E selected from the group consisting of metals and

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carbon being dispersed in the compound (carbon black, [0147]). Barker et al. teaches the use of the electrode active material to afford benefits, such as, increase capacity, enhanced cycling capability, enhanced reversibility and reduced costs [0021]. Bates et al. do not expressly disclose a first electrode and electrolyte comprising at least one common grouping of the $[XY_1Y_2Y_3Y_4]$ type, but allow for modifications to be made to the preferred embodiment (C6/L37-42) in order to enhance the cycling characteristics of the battery (C4/L9-12). Bates et al. and Barker et al. are analogous art because they are directed to the improved performance of lithium ion secondary batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the battery of Bates et al. with the first electrode of Barker et al. to enhance the cycling capability.

Regarding claim 25, modified Bates et al. discloses all claim limitations set forth above as applied to claim 24 and further discloses:

- wherein the chemical elements Y_1 , Y_2 , Y_3 and Y_4 are identical (Li_3PO_4 , C3/L45-48).

Regarding claim 26, modified Bates et al. discloses all claim limitations set forth above as applied to claim 24 and further discloses:

- wherein at least one chemical element selected from the group consisting of Y_1 , Y_2 , Y_3 and Y_4 forms a peak common to two tetrahedra (C4/L19-42).

Regarding claim 27, modified Bates et al. discloses all claim limitations set forth above as applied to claim 24 and further discloses:

- wherein the electrolyte (26) comprises nitrogen (C3/L59-62).

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Regarding claim 31, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 30, but does not expressly disclose a microbattery:

- wherein the second electrode comprises the alkaline metal ion A selected from the group consisting of lithium and sodium,
- a mixture of metallic ions T' comprising at least one transition metal ion selected from the group consisting of titanium, vanadium, chromium, cobalt, nickel, manganese, iron, copper, niobium, molybdenum and tungsten and
- a chemical element B' selected from the group consisting of sulphur, oxygen, fluorine and chlorine, so as to form a compound $A_{x_2}T'_{y_2}[X'Y'_1Y'_2Y'_3Y'_4]_{z_2}B'w_2$, with the $[X'Y'_1Y'_2Y'_3Y'_4]$ grouping, with x_2 and $w_2 \geq 0$ and y_2 and $z_2 > 0$,
- a chemical element E' selected from the group consisting of metals and carbon being dispersed in the compound so that the first and second electrodes have different intercalation potentials of the alkaline metal ion.

Barker et al. further discloses, in a battery, a second electrode comprises the alkaline metal ion A selected from the group consisting of **lithium** and sodium, a mixture of metallic ions T' comprising at least one transition metal ion selected from the group consisting of titanium, vanadium, chromium, **cobalt**, nickel, manganese, iron, copper, niobium, molybdenum and tungsten and a chemical element B' selected from the group consisting of sulphur, oxygen, **fluorine** and chlorine, so as to form a compound of $A_{x_2}T'_{y_2}[X'Y'_1Y'_2Y'_3Y'_4]_{z_2}B'w_2$ type, with the $[X'Y'_1Y'_2Y'_3Y'_4]$ grouping, with x_2 and $w_2 \geq 0$ and y_2 and $z_2 > 0$, ($Li_3CoPO_4F_2$, [0086]) a chemical element E' selected from the group consisting of metals and **carbon** being dispersed in the compound (carbon black, [0142]) Although Barker et al. does not explicitly disclose that the

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first and second electrodes have different intercalation potentials of the alkaline metal ion. The use of $\text{Li}_3\text{CoPO}_4\text{F}_2$ (LiCoPO_4) as the cathode and $\text{Li}_2\text{FePO}_4\text{Cl}$ (LiFePO_4) as the anode are taught [0086]. “Products of identical chemical composition can not have mutually exclusive properties.” A chemical composition and its properties are inseparable. Therefore, if the prior art teaches the identical chemical structure, the properties applicant discloses and/or claims are necessarily present. Barker et al. teaches use of LiCoPO_4 as the cathode and LiFePO_4 as the anode [0086]; therefore, they would have the same properties as the battery described in the instant application (P9/L1-4), specifically different intercalation potentials. In re Spada, 911 F.2d 705, 709, 15 USPQ2d 1655, 1658 (Fed. Cir. 1990). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the battery of Bates et al. with the second electrode of Barker et al. to enhance the cycling capability.

Regarding claim 32, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 31, but does not expressly disclose a microbattery:

- wherein T and T' are identical.

Barker et al. further discloses wherein T and T' are identical ($\text{Li}_2\text{Fe}(\text{PO}_3\text{F}_2)\text{F}$ and $\text{Li}_2\text{FePO}_4\text{Cl}$, [0086]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the battery of Bates et al. with the first and second electrode of Barker et al. to enhance the cycling capability.

Regarding claim 33, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 31 and further discloses:

- wherein E and E' are identical (Barker et al., carbon black, [0142] and [0147]).

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Regarding claim 34, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 31 and further discloses:

- wherein the electrolyte comprises the groupings $[XY_1Y_2Y_3Y_4]$ and $[X'Y'_1Y'_2Y'_3Y'_4]$ (Bates et al., Li_3PO_4 , C3/L45-48 and Barker et al., Li_2FePO_4Cl , [0086]; $Li_3CoPO_4F_2$, [0086]).

Regarding claim 35, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 31 and further discloses:

- wherein the elements X' , Y'_1 , Y'_2 , Y'_3 and Y'_4 are respectively identical to the elements X , Y_1 , Y_2 , Y_3 and Y_4 (Bates et al., Li_3PO_4 , C3/L45-48 and Barker et al., Li_2FePO_4Cl , [0086]; $Li_3CoPO_4F_2$, [0086]).

Regarding claim 36, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 31 and further discloses:

- wherein the second electrode is formed by the **alkaline metal** or an alloy of the alkaline metal (Barker et al., $Li_3CoPO_4F_2$, [0086]).

Regarding claim 37, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 31 and further discloses:

- wherein the second electrode is formed by a material able to be alloyed with the alkaline metal (Barker et al., $Li_3CoPO_4F_2$, [0086]).

Regarding claim 38, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 36, but does not expressly disclose a microbattery:

- wherein the material able to be alloyed with the alkaline metal is made of silicon, carbon or tin.

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Barker et al. further discloses a second electrode wherein the material able to be alloyed with the alkaline metal is made of silicon, carbon or tin ($\text{Na}_{5.25}\text{FeMn}(\text{SiO}_4)_2(\text{PO}_4)\text{Br}_{0.25}$, [0086]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the battery of Bates et al. with the second electrode of Barker et al. to enhance the cycling capability.

Regarding claim 39, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 29, but does not expressly disclose a microbattery:

- wherein the second electrode is formed by a mixed chalcogenide comprising a transition metal.

Barker et al. further discloses a second electrode formed by a mixed chalcogenide comprising a transition metal ($\text{Li}_4\text{Fe}(\text{GeO}_{3.55}\text{F}_{0.39})_3\text{F}$, [0086]). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the battery of Bates et al. with the second electrode of Barker et al. to enhance the cycling capability.

5. Claims 40 and 41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates et al. (U.S. 5,597,660) in view of Barker et al. (U.S. 2003/0027049) as applied to claims 24 above, and further in view of Hashimoto et al. (U.S. 6,287,716).

Regarding claim 40, further modified Bates et al. discloses all claim limitations set forth above as applied to claims 24-39, but does not explicitly disclose a microbattery:

- wherein a first intermediate thin layer comprising the respective constituents of the first electrode and of the electrolyte is arranged between the first electrode and the electrolyte,

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- the concentrations of the constituents of the first electrode and of constituents of the electrolyte varying respectively from 0 to 1 and from 1 to 0, from the electrolyte to the first electrode.

Hashimoto et al. discloses, in a fuel cell, wherein a first intermediate thin layer (see intermediate layer, C4/L27-40) comprising the respective constituents of the first electrode (see air electrode, C4/L27-40) and of the electrolyte (see solid electrolyte, C4/L27-40) is arranged between the first electrode and the electrolyte (C8/L38-45). Hashimoto further discloses the concentrations of the constituents of the first electrode and of constituents of the electrolyte varying respectively from 0 to 1 and from 1 to 0, from the electrolyte to the first electrode (C7/L58-64) in order for the composition between each interface to change continuously (abstract) to reduce the interface resistance between the electrode and electrolyte (C8/L32-36). Bates et al., Barker et al. and Hashimoto et al. are analogous art because they are directed towards the use of solid electrolytes and electrodes for power generation using electrochemical reactions. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the first intermediate layer of Hashimoto et al. between the first electrode of Barker et al. and the electrode in the battery of Bates et al. in order for the composition between each interface to change continuously.

Regarding claim 41, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 40, but does not explicitly disclose a microbattery:

- wherein a second intermediate thin layer comprising the respective constituents of the second electrode and of the electrolyte is arranged between the second electrode and the electrolyte,

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- the concentrations of the constituents of the second electrode and of the electrolyte varying respectively from 0 to 1 and from 1 to 0, from the electrolyte to the second electrode.

Hashimoto et al. does not explicitly disclose a second intermediate layer, but as detailed above Hashimoto et al. discloses an intermediate layer comprising respective constituents of an electrode and of a electrolyte (C8/L38-45) arranged between an electrode and electrolyte (C4/L27-40). Hashimoto further discloses the concentrations of the constituents of the electrode and of constituents of the electrolyte varying respectively from 0 to 1 and from 1 to 0, from the electrolyte to the electrode (C7/L58-64) in order for the composition between each interface to change continuously (abstract) to reduce the interface resistance between the electrode and electrolyte (C8/L32-36). Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the intermediate layer of Hashimoto et al. between the second electrode of Barker et al. and the electrode in the battery of Bates et al in order for the composition between each interface to change continuously.

6. Claims 42 and 45-46 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates et al. (U.S. 5,597,660) in view of Barker et al. (U.S. 2003/0027049) as applied to claim 35 above, and further in view of Shibano et al (U.S. 2004/0096745).

Regarding 42, further modified Bates et al. discloses all claim limitations set forth above as applied to claims 24-39 and further discloses a method for production of a microbattery:

- a second thin layer forming the electrolyte by means of a second sputtering target comprising at least the grouping $[XY_1Y_2Y_3Y_4]$ (C3/L45-48),

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Modified Bates et al. does not expressly disclose a method for production of a microbattery consisting in successively depositing on a substrate:

- a first thin layer forming the second electrode by means of a first sputtering target comprising at least the compound $A_{x2}T'_{y2}[XY_1Y_2Y_3Y_4]_{z2}B'_{w2}$ and the chemical element E',
- a third thin layer forming the first electrode by means of a third sputtering target comprising at least the grouping of $A_{x1}T_{y1}[XY_1Y_2Y_3Y_4]_{z1}B_{w1}$ type and the chemical element E.

Shibano et al. discloses successively depositing on a substrate a first thin layer forming the second electrode (3, [0036]), a second thin layer forming the electrolyte (4) by means of a second sputtering target [0037], and a third thin layer forming the first electrode by means of a third sputtering target [0038]. Although Shibano et al. does not explicitly teach the first sputtering target comprising at least the compound of $A_{x2}T'_{y2}[XY_1Y_2Y_3Y_4]_{z2}B'_{w2}$ type and the chemical element E', and the third sputtering target comprising at least the grouping of $A_{x1}T_{y1}[XY_1Y_2Y_3Y_4]_{z1}B_{w1}$ type and the chemical element E, no particular limitations are placed on the material used for the first and third sputtering target. Bates et al., Barker et al. and Shibano et al. are analogous art because they are directed to the improved performance of lithium ion secondary batteries. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make the battery of Bates et al. with the first electrode of Barker et al. to enhance the cycling capability using the method of Shibano et al.

Regarding claim 45, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 42 and further discloses:

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- wherein the electrolyte is deposited in the presence of gaseous nitrogen (C3/L45-48).

Regarding claim 46, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 42 and further discloses:

- wherein first (18) and second current collectors (20) are deposited on the substrate (22), by cathode sputtering (C3/L34-42), before deposition of the second electrode (24).

7. Claims 43 and 44 are rejected under 35 U.S.C. 103(a) as being unpatentable over Bates et al. (U.S. 5,597,660) in view of Barker et al. (U.S. 2003/0027049) in further view of Shibano et al. (U.S. 2004/0096745) as applied to claims 42 above, and further in view of Lin et al. (U.S. 2005/0280118).

Regarding claim 43, further modified Bates et al. discloses all claim limitations set forth above as applied to claims 42 and 45-56, but does not explicitly disclose a method for production of a microbattery:

- wherein a first intermediate thin layer is deposited on the second electrode by means of the first and second sputtering targets before deposition of the electrolyte.

Lin et al. discloses the means of a first and second sputtering target during deposition to achieve a concentration gradient in the layer [0062]. Lin et al. does not disclose wherein the first intermediate layer is deposited on the second electrode before the deposition of the electrolyte.

Bates et al., Barker et al., Shibano et al. and Lin et al. are analogous art because they are directed

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to manufacture of multilayer film structure using the successive deposition of each layer.

Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the means of the first and second sputtering targets of Lin et al. for the deposition of the first intermediate layer of Shibano et al. between the second electrode of Barker et al. and electrolyte in the battery of Bates et al. in order to achieve a concentration gradient in the first intermediate layer.

Regarding claim 44, further modified Bates et al. discloses all claim limitations set forth above as applied to claim 43, but does not explicitly disclose a method for production of a microbattery:

- wherein a second intermediate thin layer is deposited on the electrolyte by means of the second and third sputtering targets before deposition of the first electrode.

Lin et al. discloses the means of a second and third sputtering target during deposition to achieve a concentration gradient in the layer [0062]. Lin et al. does not disclose wherein the second intermediate layer is deposited on the electrolyte before the deposition of the first electrode. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to use the means of the first and second sputtering targets of Lin et al. for the deposition of the first intermediate layer of Shibano et al. between the first electrode of Barker et al. and electrolyte in the battery of Bates et al. in order to achieve a concentration gradient in the second intermediate layer.

Response to Arguments

8. Applicant's arguments, see page 6-8, filed September 22, 2009, with respect to rejections under 35 U.S.C. §112, second paragraph have been fully considered and are persuasive. The rejections of claims 40-41 have been withdrawn.

9. Applicant's arguments filed September 22, 2009 with respect to rejections under 35 U.S.C. §103(a) have been fully considered but they are not persuasive.

Regarding applicant's argument that one of ordinary skill in the art would not have had any reason or rationale to have modified the battery of Bates or Barker to have achieved a microbattery wherein the first electrode and the electrolyte both comprise at least one common grouping $[XY_1Y_2Y_3Y_4]$ as recited in amended claim 24 (page 9, para. 2), Bates et al. discloses modifications to be made to the preferred embodiment (C6/L37-42) in order to enhance the cycling characteristics of the battery (C4/L9-12). Barker et al. teaches the use of the electrode active material to afford benefits, such as, increase capacity, enhanced cycling capability, enhanced reversibility and reduced costs [0021]. Bates et al. specifically allows for modification to be made to the battery to enhance the cycling characteristics of said battery, and Barker et al. specifically discloses the disclosed electrode active material can be used to enhance the cycling characteristics. Therefore, one of ordinary skill in the art would have reason to modify the battery of Bates et al. with the electrode of Barker et al. to enhance the cycling characteristics of the battery of Bates et al.

In response to applicant's argument that an electrolyte having a grouping $[XY_1Y_2Y_3Y_4]$ common to the group of the active material of the electrode in order to provide a microbattery presenting a high energy storage capacity and a reduced electrical resistance (page 9, para. 4), the

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fact that applicant has recognized another advantage which would flow naturally from following the suggestion of the prior art cannot be the basis for patentability when the differences would otherwise be obvious. See *Ex parte Obiaya*, 227 USPQ 58, 60 (Bd. Pat. App. & Inter. 1985). Bates et al. suggests the active material of the microbattery can be modified to provide enhanced cycling characteristics. Barker et al. discloses an active material that provides enhanced cycling characteristics. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make microbattery of Bates et al. with the electrode of Barker et al. to enhance the cycling characteristics of the microbattery.

Regarding applicant's argument that Bates et al. and Barker et al. fail to describe any continuum between either electrode and the electrolyte, let alone a continuum between each electrode and the electrolyte (page 10, para. 1), the combination of Bates et al. and Barker et al. discloses a continuum between each electrode and the electrolyte. Bates et al. suggests the active material of the microbattery can be modified to provide enhanced cycling characteristics. Barker et al. discloses an active material that provides enhanced cycling characteristics. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make microbattery of Bates et al. with the electrode of Barker et al. to enhance the cycling characteristics of the microbattery. In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986).

Regarding applicant's argument that Bates et al. and Barker et al. fails to render obvious independent claim 24 and thus claims 40-41 (page 10, para. 4), Bates discloses modifications

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may be made to the electrodes of the microbattery to enhance cycling characteristics and Barker et al. discloses electrodes that enhance the cycling characteristics of batteries (see detailed response above, pages 15-16).

Regarding applicant's argument that Bates et al. does not require a film between the lithium-anode electrode and the electrolyte (page 10, para. 5), Bates et al. discloses a protective film is not needed to prevent reaction of the lithium anode with the electrolyte (C4/L12-17). Bates et al. discloses only a protective film is not needed. Bates et al. discloses modifications may be made to the electrode to improve the characteristics of the microbattery (C6/L37-42). Therefore, the addition of intermediate layers to the microbattery of Bates et al. would not be contrary to the teaching of Bates et al. as long as the intermediate layers are not a protective film as described (C4/L12-17).

Regarding applicant's argument that it would be directly contrary to the disclosure of Bates et al. to include a first or second intermediate layer in the microbattery (page 11, para. 1), Bates et al. only discloses a protective film is not needed between the electrode and electrolyte of the microbattery, the addition of intermediate layers that are not protective films would not be contrary to the teaching of Bates et al.

Regarding applicant's argument that one of ordinary skill in the art would not have any reason or rationale to have attempted to combine the disclosures of Bates et al. and Barker et al. with Hashimoto et al. to include an intermediate layer in the thin-film battery of Bates et al. (page 11, para. 1), Bates et al. discloses modifications may be made to the electrodes of the thin-film battery to enhance the cycling characteristics (C6/L37-42). Hashimoto et al. discloses an electrode-electrolyte-electrode assembly with intermediate layers to reduce the interface

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resistance. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make battery of Bates et al. with the intermediate layers of Hashimoto et al. to reduce the interface resistance and thus increase the cycling efficiency of the battery of Bates et al.

In response to applicant's argument that Hashimoto et al. is non-analogous art with respect to Bates et al. and Barker et al. is nonanalogous art (page 11, para. 2), it has been held that a prior art reference must either be in the field of applicant's endeavor or, if not, then be reasonably pertinent to the particular problem with which the applicant was concerned, in order to be relied upon as a basis for rejection of the claimed invention. See *In re Oetiker*, 977 F.2d 1443, 24 USPQ2d 1443 (Fed. Cir. 1992). In this case, Bates et al., Barker et al. and Hashimoto et al. are related to electrode-solid electrolyte-electrode assemblies. Further Hashimoto et al. discloses an intermediate layer that is used to decrease the interface resistance between an electrode and electrolyte. As the interface resistance is a variable that affects the cycling characteristics of a thin-film battery, the decreasing the interface resistance between an electrode and electrolyte would be analogous to enhancing the cycling characteristics. One of ordinary skill in the art would have had reason to incorporate the intermediate layers of Hashimoto et al. into the battery of modified Bates et al. to decrease the interface resistance and thus enhance the cycling characteristics.

Regarding applicant's argument Regarding applicant's argument that Hashimoto et al. describes that metals are not appropriate for the cathode, whereas Bates et al. and Barker et al. require that the electrode contain metal (page 11, para. 3), Hashimoto et al. is used to teach an intermediate layer between the electrode and electrolyte having a continuum of materials

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contained in the electrode and electrolyte to reduce the interface resistance. Hashimoto et al. is not used to teach the materials used in the intermediate layer, but the composition of the intermediate layer based on the electrode and electrolyte taught by Bates et al. and Barker et al. Therefore, it would have been obvious to one of ordinary skill in the art at the time of the invention to make battery of modified Bates et al. with an intermediate layer of Hashimoto et al. with the materials taught by Bates et al. and Barker et al. to reduce the interface resistance and thus increase the cycling efficiency.

In response to applicant's arguments against the references individually, one cannot show nonobviousness by attacking references individually (page 11, para. 4; page 12, para. 1) where the rejections are based on combinations of references. See *In re Keller*, 642 F.2d 413, 208 USPQ 871 (CCPA 1981); *In re Merck & Co.*, 800 F.2d 1091, 231 USPQ 375 (Fed. Cir. 1986). The applicant argues that none of the cited references describe an intermediate layer formed between an electrode and an electrolyte wherein the first electrode and the electrolyte comprise at least one common grouping $[XY_1Y_2Y_3Y_4]$ and the second electrode and the electrolyte comprise at least one common grouping $[X'Y'_1Y'_2Y'_3Y'_4]$. The electrodes, electrolyte and intermediate layer are taught by the combination of Bates et al. with Barker et al. and Hashimoto et al. and not taught individually by the cited references.

Regarding applicant's argument that Bates et al. and Barker et al. fails to render obvious independent claim 24 and thus claims 42 and 45-46 (page 12, para. 4), Bates discloses modifications may be made to the electrodes of the microbattery to enhance cycling characteristics and Barker et al. discloses electrodes that enhance the cycling characteristics of batteries (see detailed response above, pages 15-16).

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Regarding applicant's argument that Shibano et al. fails to describe a microbattery wherein the first electrode and the electrolyte both comprise at least one common grouping $[XY_1Y_2Y_3Y_4]$ as required in claim 24 (page 13, para. 1), Shibano et al. is not relied upon to teach the composition of the microbattery. Therefore, Shibano need not disclose the composition of the battery. The combination of Bates et al. and Barker et al. does disclose the composition of the battery as required in claim 24 (see detailed response above, pages 15-16).

Regarding applicant's argument that Bates et al. and Barker et al. fails to render obvious independent claim 24 and thus claims 43 and 44 (page 13, para. 4), Bates discloses modifications may be made to the electrodes of the microbattery to enhance cycling characteristics and Barker et al. discloses electrodes that enhance the cycling characteristics of batteries (see detailed response above, pages 15-16).

Regarding applicant's argument that Bates et al. disfavors an intermediate layer formed between the electrolyte and electrode (page 13, para. 5), Bates et al. only teaches against a protective film between the electrode and electrolyte not a layer which would decrease the interface resistance as taught by Hashimoto et al. (see detailed response above, pages 18-19).

Regarding applicant's argument that Lin et al. fails to remedy the deficiencies of Bates et al. and Barker et al. (page 13, para. 6), Lin et al. is not relied upon to teach the composition of the microbattery. Therefore, Lin need not disclose the composition of the battery. The combination of Bates et al. and Barker et al. does disclose the composition of the battery as required in claim 24 (see detailed response above, pages 15-16).

Regarding applicant's argument that Lin et al. fails to describe a method for production of a microbattery, wherein a first intermediate thin layer is deposited on the second electrode by

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means of the first and second sputtering targets before deposition of the electrolyte or wherein a second intermediate thin layer is deposited on the electrolyte by means of the second and third sputtering targets before deposition of the first electrode (page 14, para. 1), Lin et al. is not relied upon to teach the composition of the battery or the layering of the battery. Lin et al. is only relied to teach the use of multiple sputtering targets to form a concentration gradient within a layer. Therefore, Lin et al. need not describe the composition of the battery only the use of multiple sputtering targets to form a layer with a concentration gradient between the composition of multiple sputtering targets.

Regarding applicant's argument that Lin et al. fails to describe the composition of the sputtering targets (page 14, para. 2), Lin et al. is not relied upon to teach the composition of the sputtering targets only the use of multiple sputtering targets to form a concentration gradient within a layer. Therefore, Lin et al. need not describe the composition of the battery only the use of multiple sputtering targets to form a layer with a concentration gradient between the composition of multiple sputtering targets.

Regarding applicant's argument that Lin et al. fails to describe multiple layers of very specific sputtering target compounds as recited in claims 43-44 (page 14, para. 3), Lin et al. is not relied upon to teach the composition of the sputtering targets compounds only the use of multiple sputtering targets to form a concentration gradient within a layer. Therefore, Lin et al. need not describe the composition of the battery only the use of multiple sputtering targets to form a layer with a concentration gradient between the composition of multiple sputtering targets.

Conclusion

10. **THIS ACTION IS MADE FINAL.** Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the mailing date of this final action.

11. Any inquiry concerning this communication or earlier communications from the examiner should be directed to Sean P. Cullen whose telephone number is 571-270-1251. The examiner can normally be reached on Monday thru Thursday 6:30 a.m. to 5:00 p.m.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Basia Ridley can be reached on 571-272-1453. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/S. P. C./

Examiner, Art Unit 1795

/Robert Hodge/

Primary Examiner, Art Unit 1795